

Trelleborg Slovenija Rubber Sheave Liners

User's Instructions

INTRODUCTION

This document contains relevant information on rubber sheave liners made by Trelleborg Slovenija. Any use of liners that does not conform with instructions given herein shall void warranty given by Trelleborg Slovenija.

A rubber sheave liner is, according to Regulation (EU) 2016/424 of the European Parliament and of the Council a safety component of a cableway installation. A *safety component* is a component of equipment or any device intended to be incorporated into a subsystem or a cableway installation for the purpose of ensuring a safety function, the failure of which endangers the safety or health of passengers, operating personnel or third parties.

Relevant operating and safety instructions given by the manufacturer of the cableway installation shall be followed by the operator of the cableway installation.

Trelleborg Slovenija rubber sheave liners (further: TS liners) are made entirely of a new rubber reinforced with textile carcass. The liners are entirely developed in our in-house laboratory. TS liners, see Figure 1, are ready-to-use. No extra work and/or finish-up by the customer is required before use.

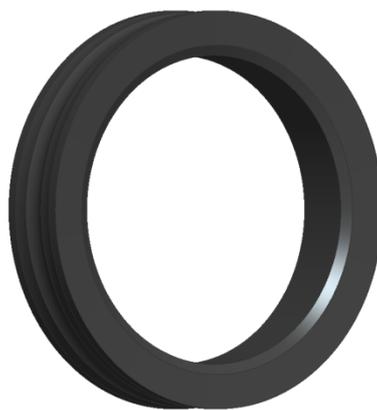


Figure 1: A Trelleborg Slovenija rubber sheave liner

For detailed information and additional questions please contact our technical team. Contact can be found on the last page of these User's Instructions.

APPLICATION, CHOICE AND EXCLUSIONS

Trelleborg Slovenija rubber sheave liners (further: TS liners) are designed according to technical specification of the manufacturer of cableway installation. TS liners ensure secure guidance to the towing rope and a smooth passage for grips. Trelleborg Slovenija offers custom-made dimensions and designs of sheave liners to meet various requirements of various applications and purposes. TS liners as a single component of a roller are designed to ensure support and guidance of ropes according to requirements specified by the manufacturer of the cableway installation.

TS liners are designed for the use with various types of cableway installations, such as aerial ropeways, chairlifts, gondola lifts, ski-tows etc. Sheave liner type shall be chosen with respect to the appropriate wheel and rope type and diameter as specified by the manufacturer of the cableway installation.

Only stranded rope type(s) specified by the manufacturer of the cableway installation shall be used with TS liners. Unless stated otherwise and for the avoidance of doubt only the following classes of stranded ropes defined in EN 12385-8 shall be used with TS liners:

- Class 6×7 with fibre core (construction cross section example 6×7-FC);
- Class 6×19 with fibre core (construction cross section example 6×25F-FC);
- Class 6×36 with fibre core (construction cross section example 6×36WS-FC).

The customer shall choose, install and use rubber linings depending on the rope diameter according to the specification by the manufacturer of the cableway. TS liners of a diameter at least of 200 mm are designed for using with towing ropes up to 16 mm in diameter. TS liners of a diameter of at least 250 mm are intended for using with towing ropes over 16 mm in diameter.

Exclusions:

- TS liners shall not be used with warning ropes for aircraft or telephone ropes, whose breakage could be hazardous for the cableway system. Further, track rope from a bi-cable aerial ropeway shall not be used in combination with the TS liners.
- TS liners shall, according to the Regulation (EU) 2016/424 of the European Parliament and of the Council, not be used for cableway installations that are categorised by EU Member States as historic, cultural or heritage installations, that entered service before 1 January 1986 and are still in operation, and that have not had any significant changes in design or construction.
- Any use of other rope type than specified above shall be approved by Trelleborg Slovenija. Any utilisation of a liner size other than specified by the manufacturer of the cableway installation shall be approved by Trelleborg Slovenija. Further, any change on the liner, such as, groove depth or shape, is forbidden.

STORAGE

The storage conditions influence lifecycle of TS liners in very important way. Inappropriate storage may result in degradation of sheave liners. Rubber products are especially, but not limited to, sensitive to exposure to excessive heat, Oxygen, Ozone, solvents, solar radiation, as well as compression or tension loads during storage.

Ideal storage is a dark cool place with air temperature in the range +10°C ...+25°C. Any heat source in the storage, such as radiator, shall be put at least 1 m away from the stored TS liners.

MAXIMAL STORAGE PERIOD

Unless state otherwise in General sales conditions MOTO, see: <http://www.savatech.eu/general-sales-conditions-warranty-conditions.html>, Trelleborg Slovenija guarantees a minimum of 30.000 km of sheave liners run under conditions specified by the manufacturer of the cableway installation. The warranty is valid for 18 months after the TS liner operation start and no longer than 2 years from the date of invoice. Installation of a TS liner older than 2 years is the sole responsibility of the cableway installation operator.

Each TS liner shall be separately examined before mounting. In case of any damage, such as hardenings, straining, cracks, outbursts, mountains, valleys, deformations, soaked or sticky or any other visible changes, a TS liner shall not be assembled and put in service.

INSTALLATION

TS liners are designed to ensure the correct movement of rope onto and off wheels, rollers and roller batteries, according to installation requirements specified by the manufacturer of cableway installation.

The customer shall only utilise wheel rings and wires for securing the solid ring on the wheel ring according to requirements specified by the manufacturer of the cableway installation.

A clean TS liner shall be mounted on a clean wheel ring before use. Special attention shall be paid to cleaning oily and greasy surfaces. Internal surface of a TS liner may before assembly be lubricated with minimal quantity of clean water. Water can be applied to the liner and the wheel ring.

Cleaning of a TS liner, a wheel ring or rope using solvents is strictly forbidden. Any use of oil or grease to lubricate the sheave liner or wheel ring is strictly forbidden.

Excessive amount of water shall be removed. Excessive use of water may cause slippage of the TS liner on the wheel ring during operation.

A liner is pressed onto a wheel ring. A special mounting tool and a mounting cone shall be used, see Figure 2. Assembly shall only be performed in horizontal position by qualified personnel.

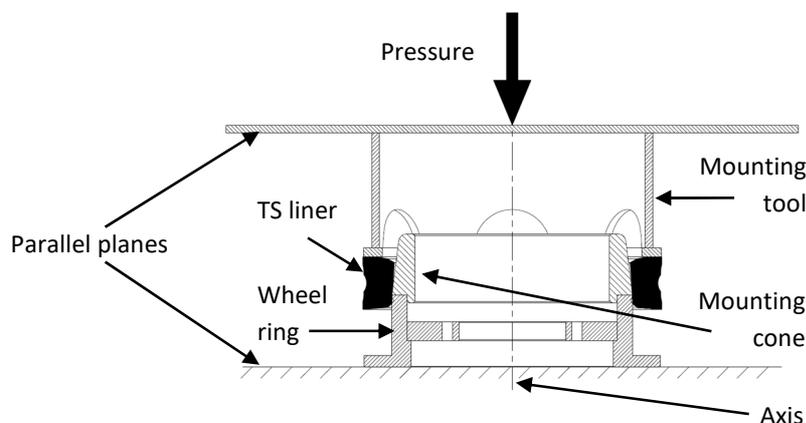


Figure 2: Principle of pressing of a TS liner on a wheel ring

It is of crucial importance that a TS liner is pressed on the wheel ring axially parallel. Overstretching of a liner can lead to liner damage. Any damaged liner shall be disposed and not assembled anymore.

Diameters of the mounting cone, see Figure 3:

D₁ ... wheel ring diameter

D₂ ... inner diameter of the mounting cone; typically, 5...10 mm smaller than the inner diameter of a liner.

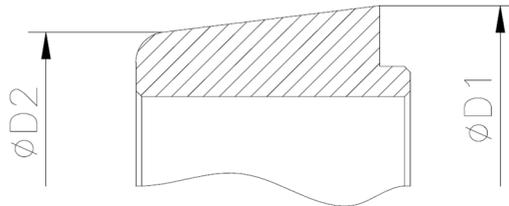


Figure 3: Cross-section of the mounting cone

OPERATION AND MAINTENANCE OF THE CABLEWAY INSTALLATION

The cableway installation shall be operated and maintained according to the specification by the manufacturer of the cableway installation. Only spare parts approved by the manufacturer of the cableway installation shall be used.

The customer shall ensure alignment of wheels, rollers and roller batteries in the plane formed by the movement of the incoming and outgoing rope. Support and guidance of the rope on the line and in the stations alignment of sheaves, rollers and roller batteries shall be ensured and maintained as specified by the manufacturer of the cableway installation. Roller batteries shall be adjusted so that the carrying-hauling rope runs as nearly as possible in the middle of the groove when travelling both forward and in reverse. The customer shall check that a grip is not becoming jammed in case of the loss of a roller or the abnormal wear of the roller lining because of seizure of a roller.

Only spare parts approved by the manufacturer of the cableway installation shall be used and installed to limit movement of the battery rockers to ensure passage of the grips in case of a seized or missing roller, to prevent or minimize chance of deropement, and in event of whole or partial derailment of the rope from the rollers onto the rope-catchers.

If monitoring of the rope position is not ensured by line safety circuits, the position of the rope shall be monitored by suitable devices, such as derailment detectors or contact plates for track ropes. Derailment detectors shall act according to the specification by the manufacturer of the cableway installation. It shall be possible to check that the rope position monitoring devices act correctly on the line safety circuits simply and in situ, except in justified cases.

TS liners are compatible with rope lubricants, such as *Elaskon 20* and *Motorex Alpine cable protect*. Compatibility was approved according to EN 12385-8 A.2.2 and comply with ISO 1817. Only a small amount of grease may be used. Use of any other lubricant type is at the sole responsibility of the customer. Maintenance instructions issued by the manufacturer of the cableway installation must be adhered to. In case of doubt, please contact Trelleborg Slovenija.

INSPECTION OF A ROLLER BEFORE START-UP

The following items shall be checked after successful TS liner installation on the wheel ring, see Figure 4:

- Each solid ring shall be secured by the wire,
- Centric position of the TS liner with respect to the wheel ring,
- Symmetric rotation of the grooved surface,
- Correct distance between the wheel flange and wheel ring defined in the corresponding drawing of the roller,
- Correct torque on screws and bolts.

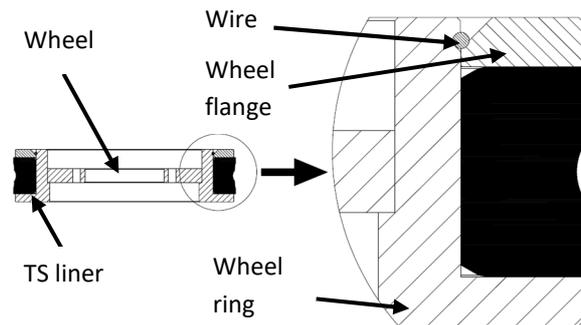


Figure 4: The TS liner assembled between the wheel flanges

A TS liner shall be removed from operation in case of any visible nonconformities, such as bulges or recess, or visible cracks or any higher strain of the liner than allowed during liner assembly.

EXPOSURE AND LOADS

Maximum velocity and maximum load of TS liners as specified by the manufacturer of the cableway installation shall be exceeded.

TS liners are made from special rubber compound with extreme abrasion resistance, high flexibility and low heat build-up during operation. TS liners can be used in the temperature range $-40^{\circ}\text{C} \dots +50^{\circ}\text{C}$.

INSPECTIONS IN SERVICE

Inspections of TS liners in service shall be performed in the extent and intervals defined by the manufacturer of the cableway installation. Recommended checks of TS liners are on daily, weekly and annual basis.

Checks include but are not limited to: visual appearance of cracks, unusual or excessive abrasion, noise and/or excessive increase in temperature.

The following inspections of TS liners shall be performed:

- Monthly inspections of external condition, position and fixing of rollers, including, but not limited to rubber liners.
- Daily test runs before the cableway operation shall be extended at least to the position of the rope on the wheels, rollers and grips as well as function of the ice scrappers of the wheels.
- Daily test run of the cableway shall include inspection of the rope position, correct direction of rollers and correct operation of rollers on both sides of the cableway.



It is suggested to keep records on:

- Number of operating hours,
- Inspection dates,
- Values measured at inspection, such as hardness and temperature,
- Date of changing the TS liner.

For any additional information please contact:

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